U.S. Department
of Transportation

**Research and
Special Programs
Administration**

MAR 20 2000

400 Seventh Street, S.W.
Washington, D.C. 20590

DOT-E 9001
(SIXTH REVISION)

EXPIRATION DATE: November 30, 2001

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: UEF Chesterfield Cylinders, Derbyshire, England
(Formerly: Chesterfield Cylinders)
(U.S. Agent: BIE International Inc., Houston, TX)

2. PURPOSE AND LIMITATIONS:

a. This exemption authorizes the manufacture, mark, sale and use of a non-DOT specification cylinder conforming with all regulations applicable to a DOT 3T Specification cylinder, except as modified herein, for the transportation in commerce of the materials authorized by this exemption. This exemption provides no relief from any Hazardous Materials Regulation (HMR) other than as specifically stated herein.

b. The safety analyses performed in development of this exemption only considered the hazards and risks associated with transportation in commerce.

3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.

4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR §§ 173.301, 173.302, 173.304, and 175.3; in that non-DOT specification cylinders are not authorized.

5. BASIS: This exemption is based on the application of UEF Chesterfield Cylinders dated October 26, 1999, submitted in accordance with § 107.109 and supplemental information dated February 22, 2000.

6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Proper Shipping Name/ Hazardous Material Description	Hazard Class/ Division	Identification Number	Packing Group
Air, compressed	2.2	UN1002	N/A
Argon, compressed	2.2	UN1006	N/A
Boron trifluoride	2.3	UN1008	N/A
Helium, compressed	2.2	UN1046	N/A
Neon, compressed	2.2	UN1065	N/A
Nitrogen, compressed	2.2	UN1066	N/A
Oxygen, compressed	2.2	UN1072	N/A
Carbon dioxide	2.2	UN1013	N/A
Ethylene, compressed	2.1	UN1962	N/A
Methane	2.1	UN1971	N/A
Nitrous oxide, compressed	2.2	UN1070	N/A

7. SAFETY CONTROL MEASURES:

a. PACKAGING - Packaging prescribed is a non-DOT specification steel cylinder made in compliance with Drawings 47482P dated January 11, 1983 and 47593P dated August 9, 1983 on file with the Office of Hazardous Materials Exemptions and Approvals (OHMEA), and DOT 3T (§§ 178.35 and 178.45) except as follows:

§ 178.35(f) Markings. Each cylinder must be marked "DOT-E 9001" in lieu of "DOT 3T".

§ 178.45(a) *Type, size and service pressure*

Each cylinder must be of seamless construction with one end concave to pressure, the bottom to be convex to pressure. The maximum water capacity is 120 pounds with a minimum service pressure of 1,800 p.s.i.

§ 178.45(b) *Material, steel.*

The provisions remain the same except the steel analysis must conform to the following:

ANALYSIS TOLERANCES

Element (percent)	Ladle analysis	Check Analysis	
		Under	Over
Carbon	0.33 to 0.40	0.03	0.04
Manganese	0.60 to 1.05	0.04	0.04
Phosphorus (max)	0.015	.... 0.01	
Sulfur (max)	0.015	.... 0.003	
Silicon	0.15 to 0.35	0.02	0.03
Chromium	0.80 to 1.15	0.05	0.05
Molybdenum	0.15 to 0.25	0.02	0.02

§ 178.45(c) *Manufacture*

Add the following:

(6) The thickness of the bottoms of the cylinders must be at least two times the minimum wall thickness of the cylindrical shell; such bottom thickness to be measured within an area bounded by a line representing the points of contact between the cylinder and floor when the cylinder is in a vertical position.

(7) Each new design and any significant change to any acceptable design must be qualified for production by testing prototype samples as follows:

(a) Three samples must be subjected to 100,000 pressure reversal cycles between zero and service pressure or 10,000 pressure reversal cycles between zero and test pressure, at a rate not in excess of 10 cycles per minute without failure.

(b) Three samples must be pressurized to destruction and failure must not occur at less than 2.5 times the marked cylinder service pressure. Each cylinder must remain in one piece. Failure must initiate in the cylinder sidewall in a longitudinal direction. Rate of pressurization must not exceed 200 psi per second.

(8) In this specification "significant change" means a 10 percent or greater change in cylinder wall thickness, service pressure, or diameter; a 30 percent or greater change in water capacity or base thickness; any change in material; over 100 percent increase in size of openings; or any change in the number of openings.

(9) After all shell forming operations and prior to closing in, the cylindrical section of each shell must be examined in accordance with ASTM Standard A-388-80 using the angle beam technique. The equipment used must be calibrated to detect a notch equal to five percent of the design minimum wall thickness. Any discontinuity indication greater than that produced by the five percent notch must be cause for rejection of the shell unless the discontinuity is repaired within the requirements of this specification.

§ 178.45(d) *Wall thickness*

The minimum wall thickness must be such that the wall stress at the minimum specified test pressure does not exceed 67 percent of the minimum tensile strength of the steel as determined by the physical tests required in paragraphs (j) and (k).

A wall stress of more than 90,500 p.s.i. is not permitted.

In no case may wall thickness be less than 0.210 inch.

(1) * * *

(2) Does not apply.

§ 178.45(h) *Ultrasonic examination*

Add the following:

Wet magnetic particle examination for detecting the presence of quench cracks may be substituted for the ultrasonic examination prescribed in this section. When magnetic particle examination is performed it must be done after the hydrostatic test on the cylindrical section of each cylinder in accordance with ASTM Standard E 709-80. Any cylinder found to have a quenching crack must be rejected and may not be requalified.

b. TESTING - Each cylinder must be requalified for use in accordance with § 173.34 as prescribed for DOT 3T cylinders.

c. OPERATIONAL CONTROLS -

(1) These cylinders may not be used for carriage of gases that would cause hydrogen embrittlement of the steel.

(2) Filling limits specified in § 173.302(c) are authorized.

(3) The following provisions apply to the transportation of methane:

(i) Each cylinder must be filled only with non-corrosive compressed natural gas (scrubbed to remove acid gases) and may not contain any liquefied gas. At any time the cylinder may not contain gas having more than:

(A) 0.5 lbs. of water per million cubic feet at standard temperature and pressure (STP) (60°F, 30 inches Hg).

(B) 0.1 grain of hydrogen sulfide per 100 cubic feet at STP as determined by ASTM D 2385-76 Test for Hydrogen Sulfide and Mercaptan Sulfur in Natural Gas (Cadmium-Sulfate Iodometric Titration Method).

(C) Total Soluble Sulfides other than H_2S or soluble sulfides must be less than 0.1 grain per 100 cubic feet at STP.

(D) One percent by volume of oxygen.

(E) Three percent by volume of carbon dioxide.

(F) Four percent total (including but not limited to items (D) & (E) of this paragraph) by volume of all non-hydrocarbon gases (excluding nitrogen).

(ii) The shipper is responsible for establishing procedures to determine the composition and impurity level of the gas at each facility used for filling the cylinders, and to verify a compliance to the requirements of this exemption. Records of the gas composition and impurity levels must be maintained for three years.

(iii) Cylinders that become contaminated with H_2S or soluble sulfides must be condemned.

(iv) During any unloading operation each cylinder must be inclined to an angle that lowers the centerline of the cylinder at the discharge end to a point lower than any portion of the opposite end of the cylinder.

8. SPECIAL PROVISIONS:

a. In accordance with the provisions of Paragraph (b) of § 173.22a, persons may use the packaging authorized by this exemption for the transportation of the hazardous materials specified in paragraph 6, only in conformance with the terms of this exemption.

b. A person who is not a holder of this exemption, but receives a package covered by this exemption, may reoffer it for transportation provided no modifications or changes are made to the package and it is offered for transportation in conformance with this exemption and the HMR.

c. A current copy of this exemption must be maintained at each facility where the package is offered or reoffered for transportation.

d. Each packaging manufactured under the authority of this exemption must be marked with a registration symbol designated by the Office of Hazardous Materials Exemptions and Approvals for a specific manufacturing facility.

e. A current copy of this exemption must be maintained at each facility where the package is manufactured under this exemption. It must be made available to a DOT representative upon request.

f. Reports:

(1) Prior to the initial shipment of cylinders made to any specific design, a report of test results specified in § 178.45(n) must be submitted to the OHMEA.

(2) The manufacturer of the cylinder under this specification must retain the test reports required by this specification for 15 years from the original test date on the cylinder.

g. Cylinders made under this exemption may be transported in an upright position.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel and cargo aircraft only.

10. MODAL REQUIREMENTS: A current copy of this exemption must be carried aboard each cargo vessel or aircraft used to transport packages covered by this exemption. The shipper must furnish a copy of this exemption to the air carrier before or at the time the shipment is tendered.

11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:

- o All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, Parts 171-180.
- o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this exemption, including display of its number, when the exemption has expired or is otherwise no longer in effect.

12. REPORTING REQUIREMENTS: The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (Sections 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder(s) of this exemption must also inform the AAHMS, in writing, as soon as practicable of any incidents involving the package and shipments made under this exemption.

Issued at Washington, D.C.

for Robert A. McGuire
Acting Associate Administrator for
Hazardous Materials Safety

MAR 20 2000
(DATE)

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590.

MAR 20 2000

Attention: DHM-31.

The original of this exemption is on file at the above office. Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

Copies of exemptions may be obtained from the AAHMS, U.S. Department of Transportation, 400 7th Street, S.W., Washington, DC 20590-0001, Attention: Records Center, 202-366-5046.

Dist: FAA, FHWA, USCG
PO: KW/AM(00), MT